

Hambach Forest in crisis:

Study on the micro- and mesoclimatic situation as well as edge effects

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Like no other forest in Germany, the Hambach forest stands for the current climate crisis. Instead of creating new CO₂ sinks, existing ones are being dismantled by destroying forests in order to obtain fossil fuels, the use of which will intensify anthropogenic climate change. But the climate crisis extends over several scales. Not only is it a global crisis, it also exists at the micro and mesoclimatic levels.

The aim of this first study on edge effects is to analyse the vegetation-dependent microclimate in and around the Hambach forest. First, the influence of open land and open pit mining on surface temperature shall be determined. It can be observed that the edge effects emanating from the Hambach open-cast mine worsen the situation of the ecologically valuable Hambach Forest. At the edges of the forest the increased death of trees exposed to particular heat and drought stress can be seen. In addition, there has been a considerable amount of windthrow, especially at the edge of the forest facing open-cast mining.

With the help of satellite-based evaluation methods (MODIS and Landsat 8) it was confirmed that in spring, summer and autumn the Hambach opencast mine is the heat pole of the investigation area (MODIS: in the heat of summer 2018 almost 45°C). According to MODIS data, the (larger) forest areas are the coolest areas in these seasons. This cooling effect is particularly pronounced in summer; in the months June/July/August the coolest areas are up to 22°C cooler than the warmest ones, in winter the temperature difference is about 3°C. In summer it also becomes clear that the area of the Hambach Forest is on average 11°C cooler than the hottest areas in the study area. The spatial distribution of the Landsat 8 surface temperatures largely confirms the patterns of MODIS-based analysis. The open pit mines and especially the Hambach open pit mine are the heat poles of the region in summer. In some years average surface temperatures of more than 45°C are recorded. The temperature difference between the hottest and coolest points in the study area is 22°C in the relatively hot summer of 2018. It is noticeable that in the hot summer of 2018 not only the opencast mines but also the open land areas such as agricultural land and settlement areas warm up relatively strongly, while forest and woodland areas remain comparatively cooler.

Reforestation can provide visible cooling of the landscape. If the Hambach forest, which is worthy of protection due to its age and forest continuity, is to be preserved, a package of measures urgently needs to be implemented to cool the landscape around it. This includes an immediate stop to the further excavation of the Hambach opencast mine, the recultivation and reforestation of (former) roads and gravel opencast mining as well as of agricultural areas adjacent to the forest. This should create a thermal buffer zone ideally up to 500 m wide, but at least up to the edge of the pit on the side facing the opencast mine.

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